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(71) Applicant: **Sen-S-Projects BVBA**
2260 Westerlo (BE)

(72) Inventor: **De Backer, Stephan**
2260 Westerlo (BE)

(74) Representative: **Philippaerts, Yannick**
Arnold & Siedsma
Bezuidenhoutseweg 57
2594 AC The Hague (NL)

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(54) **PRESSURISED CONTAINER COMPRISING A FLOW REGULATOR**

(57) Pressurized container for dispensing a product, wherein the pressurized container has a tubular body with a movable piston which divides the space inside the tubular body into two chambers, wherein a first chamber of the two chambers is provided to be filled with the product and wherein a second chamber of the two chambers is provided to be filled with a gas under pressure, wherein the pressurized container further comprises a channel extending outside from the first chamber in order to dispense the product, which channel is provided with a valve which can be operated by a user and which channel is further provided with a flow regulator.

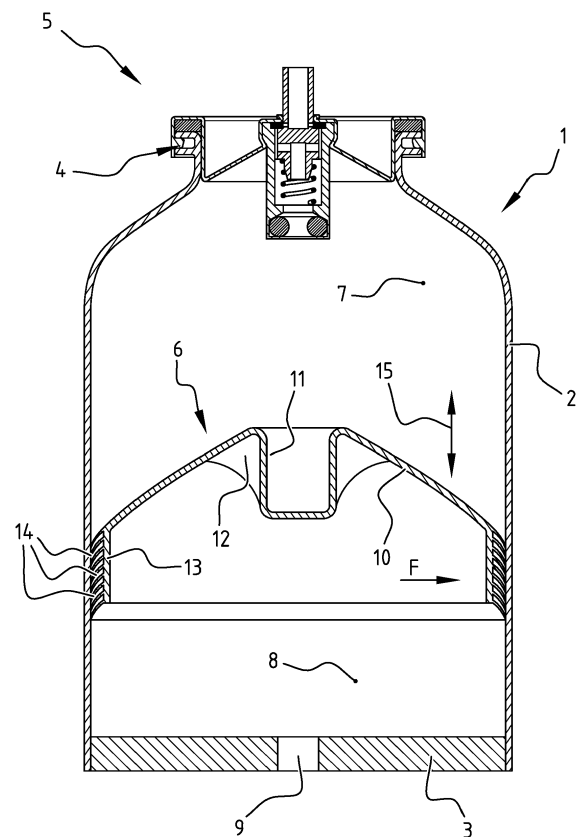


FIG. 1

Description

[0001] The present invention relates to a pressurized container for dispensing a product. Pressurized containers are frequently used in the cosmetic industry in particular, for instance for dispensing shaving gel, shaving foam, hairspray and other products.

[0002] Two basic principles can be applied to dispense a product from a container. The container either has a pump mechanism such that a user can build up pressure by operating the pump in order to pump the product out of the container, or the container has a mechanism for building up and/or maintaining internal pressure which drives the product outward when the user opens a valve. The present invention relates to the latter type of container. This is because tests have shown that it is considerably more comfortable for a user to operate a valve wherein the product is expelled from the container automatically than to operate a pump and thus produce the energy necessary to draw the product from the container him/herself. Such a container in which a mechanism for building up and/or maintaining internal pressure is present will be referred to hereinafter as pressurized container. The term dispensing, for instance in the part-sentence dispensing a product, must be understood as the English word dispensing.

[0003] US 6,070,770 describes an aerosol container under pressure with a flow regulator. In this aerosol container under pressure a gas under pressure is mixed with the product in the container. The container is provided with a valve so that the product can be dispensed. US 6,070,770 also describes that the pressure in the pressurized container drops as use of the container increases. A flow regulator is provided at the position of the valve in order to create a constant outflow.

[0004] The drawback of this configuration is that only an extremely limited number of products can be dispensed on the basis of this technique. This is because the product has to be able to mix with the gas at least temporarily so that it can be driven outward by the gas. A further drawback is that the flow regulator has a complex form and is thereby expensive. The position of the container during dispensing of product, for instance upright position, upside down position or lying position, will further determine the concentration of the product which is expelled, particularly when the solubility of the product in the gas is not 100%. It will hereby still not be possible to obtain a constant dispensing of product from the container, despite the flow regulator.

[0005] FR 2714 363 describes a pressurized container comprising a movable piston which divides the inner space of the container into two chambers. A lower chamber is filled here with gas under pressure, and an upper chamber is filled with the product. The bottle is provided with a valve at the position of the upper chamber. Because the piston is movable, the pressure in the lower chamber will also build up a pressure in the upper chamber, whereby the product in the upper chamber is also

under pressure. Operating the valve will have the result that the product is driven outward. A drawback of this pressurized container is that the pressure difference between the situation in which the upper chamber is fully filled and the situation in which the upper chamber is substantially empty is so great that a uniform dispensing of the product is impossible.

[0006] US 2007/0125809 provides a solution for this problem by providing three chambers in the container. A lower chamber is formed by a cartridge filled with gas and having a substantially fixed form. Provided above the cartridge is a piston, whereby a middle chamber is created between the piston and the cartridge in the container. The cartridge is provided here with a pressure reducing valve such that the middle chamber has a substantially constant pressure, irrespective of the pressure in the cartridge. The upper chamber is provided with the product and with a valve for dispensing the product. Because the middle chamber has a substantially constant pressure, the piston will drive the product outward with a substantially constant force when the valve is open. A constant dispensing of product is hereby obtained. A drawback of this configuration is that the pressurized container has a complex construction and is therefore expensive to manufacture.

[0007] It is an object of the invention to provide a pressurized container which can be applied for different types of product and which is comfortable to use for a user.

[0008] The invention provides for this purpose a pressurized container for dispensing a product, wherein the pressurized container has a tubular body with a movable piston which divides the space inside the tubular body into two chambers, wherein a first chamber of the two chambers is provided to be filled with the product and wherein a second chamber of the two chambers is provided to be filled with a gas under pressure, wherein the pressurized container further comprises a channel extending outside from the first chamber in order to dispense the product, which channel is provided with a valve which can be operated by a user and which channel is further provided with a flow regulator.

[0009] The specific construction of the pressurized container according to the invention has multiple advantages. A first advantage is that the product in the container does not come into contact with the gas under pressure. As a result the product will not have to dissolve in the gas, and the gas will not mix with the product. Different types of product can hereby be dispensed by the container. This allows products in gas, powder, liquid or gel form, such as cosmetic products and food products, to be packaged in such pressurized containers. Another advantage is that the orientation of the pressurized container has no effect on the uniformity of dispensing of the product. Concretely, this means that the pressurized container will dispense the product in the same way whether it is in upright, in lying or in upside down position. This considerably increases the convenience of use for the user. A further advantage of the pressurized container

according to the invention is that the flow rate at which the product is dispensed is substantially constant owing to the flow regulator provided at the position of the valve. This flow regulator makes the dispensing of the product uniform, irrespective of the pressure differences which may occur in the first chamber as a result of the dispensing of the product. The user hereby obtains a predictable dispensing, irrespective of the degree to which the pressurized container is filled with product. The pressurized container further has a simple construction and is thereby inexpensive to produce.

[0010] The flow regulator is preferably provided to vary an opening of the channel inversely proportionally relative to a pressure in the first chamber. The size of the opening of the channel determines the resistance encountered by the product when moving through the channel. By varying the opening of the channel inversely proportionally to the pressure in the first chamber the opening will be relatively small when the pressure in the first chamber is relatively high, while the opening of the channel will be relatively large when the pressure in the chamber is relatively low. The pressure difference in the chamber is hereby compensated by the size of the opening of the channel. This flow regulation is based on the insight that the flow rate is roughly equal to the product of the size of the opening of the channel and the pressure difference between the first chamber and the surrounding area.

[0011] The flow regulator is preferably provided to continuously vary an opening of the channel as a function of a pressure of the first chamber. By varying the opening continuously a continuous flow regulation is obtained, and the flow rate can thus be precisely controlled during the useful life of the pressurized container.

[0012] The flow regulator preferably comprises a conical housing in which an elastic annular element is placed such that the channel runs through the housing and the annular element, all this such that the annular element narrows the channel when the product flows through the channel, and wherein the narrowing is dependent on the pressure difference between the first chamber and a surrounding area. Constructing a flow regulator with a conical housing and an annular element is technically simple and thereby inexpensive. The operation of such a preferred flow regulator can further be precisely determined by varying the degree of conicity, by determining the elasticity of the annular element and/or by choosing the ratio between dimensions of the conical housing and the annular element. Because the operation of the flow regulator can be determined in simple manner during construction of the regulator, such a flow regulator is highly suitable for regulating the flow rate in the pressurized container according to the invention. This is because the pressurized container according to the invention can be applied for different types of product with varying flow properties. The flow regulator can be selected or constructed in simple manner on the basis of the flow properties of the product, whereby a constant dispensing of

the product is obtained. Gaseous products can here be dispensed by the container, aqueous liquid products can be dispensed by the container, and viscous gel-like products can be dispensed by the pressurized container. The flow regulator will be configured differently for each of these products in order to obtain a substantially uniform dispensing of the product which is comfortable for the user. This is possible in simple manner with this preferred flow regulator.

[0013] The valve preferably has an open position in which the channel is provided to allow passage of the product, and a closed position in which the channel is blocked in order to retain the product in the first chamber. The valve is further preferably formed here as a push button mounted on a spring element, so that the push button is pushed to the closed position by the spring element and so that a user can push the push button to the open position counter to the spring element. Such valves are generally known to the skilled person and can typically be mounted on a spring element as push button. Because the push button is pressed to the closed position by the spring, the pressurized container will be closed when at rest, i.e. in a situation in which it is not being operated by a user. When a user operates the push button counter to the spring element, the valve will open and the product from the pressurized container will flow out via the channel. Such a configuration of a push button is generally deemed very pleasant for a user and can be operated easily and comfortably.

[0014] An axis of the conical housing preferably substantially coincides with an axis of the spring element. Because the channel runs through the conical housing, the channel will also run substantially along the axis of the conical housing. This means that the product can flow through the conical housing and directly through the spring element. An optimal product flow through the channel can hereby be obtained, so that an undesired blocking of the channel is prevented. The technical construction of the valve and flow regulator is further very simple when the flow regulator is mounted directly below the spring element. This simplifies mounting of the flow regulator and the valve on the pressurized container. Finally, such a construction is found to be very compact, so that the valve and flow regulator take up little space in the container. The inner space of the container can hereby be used optimally.

[0015] The push button preferably comprises an internal channel lying at least partially in line with the spring element at the position of the spring element. Because the push button has an internal channel at the position of the spring element and lies in line therewith, the product will flow through the channel without the position of the spring affecting the product flow through the spring. This would be different were the channel formed along an outer side of the push button, whereby the product would have to flow through the spring elements in the transverse direction of the spring. When such a spring is compressed the openings between the different spring

elements will become smaller, whereby the channel is narrowed and the product can no longer flow through properly. This is a problem particularly in the case of viscous products. By providing the channel internally in the push button and providing this channel in line with the spring element, the product can flow through the core of the spring element. The diameter of the core of the spring element is substantially the same here whether the spring is compressed or extended.

[0016] The product in the first chamber is preferably physically separated from the gas in the second chamber by the movable piston. By physically separating the gas and the product, the gas cannot contaminate the product. The pressurized container according to the invention is hereby suitable for food products. A further advantage is that the first chamber can be filled with product without there being gas in the first chamber. The result hereof is that the pressurized container can be used in any orientation.

[0017] The piston is preferably movable such that the pressure in the first chamber is substantially the same as the pressure in the second chamber. As a result of this action of the piston, the product will be automatically expelled from the container when the second chamber is under pressure. This is because, when the second chamber is under pressure, the first chamber will also come under pressure due to the movable piston, so that opening the channel automatically results in the product being driven via the channel to a position outside the container.

[0018] The second chamber is preferably provided with a filling opening for filling the second chamber with the gas, which filling opening can be closed by a plug. This allows the first chamber of the pressurized container to be filled first, without an appreciable pressure prevailing in the second chamber. The second chamber can then be filled with gas under pressure, preferably ambient air under pressure, in order to thus also place the first chamber under pressure and make the pressurized container operational.

[0019] The product is preferably chosen from a cosmetic product and a food product. Tests have shown that cosmetic products and food products can be dosed by a user in comfortable and simple manner when placed in a pressurized container according to the invention. The construction of the pressurized container further allows cosmetic and/or food products to be contained, since the construction of the container allows an inert gas or ambient air to be used as gas under pressure, rather than a harmful propellant. The gas under pressure and the product further remain separated in the pressurized container according to the invention, so that the product is not contaminated with the gas.

[0020] The movable piston is preferably bowl-shaped, wherein the piston comprises a bottom and an upright wall, wherein the open side of the bowl-shaped piston is directed toward the second chamber and wherein the upright wall is provided at the position of its outer side

with a plurality of concentric and elastic lips which are pressed against the inner wall of the tubular body by the pressure in the second chamber so as to separate the second chamber from the first chamber. By providing a plurality of elastic lips, preferably at least three elastic lips, more preferably at least four elastic lips and most preferably at least five elastic lips, bleed through the movable piston can be prevented. Bleed through the movable piston is understood here as failure of the piston to keep gas in the second chamber, i.e. failure to prevent this gas moving to the first chamber.

[0021] The piston is preferably manufactured from an elastic material. By manufacturing the bowl-shaped piston from an elastic material the application of a pressure to the inner side of the piston, which is directed toward the second chamber, will have the result that the walls of the piston are pressed outward and are thus pressed against the inner side of the tubular housing. This action allows a variation in the diameter of the tubular housing to be compensated. This variation can be a result of manufacturing deviations and/or of the internal pressure in the container.

[0022] The invention will now be further described on the basis of an exemplary embodiment shown in the drawing.

[0023] In the drawing:

figure 1 shows a cross-section of a pressurized container according to an embodiment of the invention; figure 2 shows a cross-section of a flow regulator according to an embodiment of the invention in closed position; and figure 3 shows a cross-section of the flow regulator of figure 2 in open position.

[0024] In the drawing the same or similar elements are given the same reference numeral.

[0025] Figure 1 shows a pressurized container 1 according to an embodiment of the invention. Pressurized container 1 has a substantially tubular body 2 which is closed at the position of an underside. In the embodiment of figure 1 a bottom element 3 which closes tubular body 2 of pressurized container 1 at the position of an underside is provided at the position of the underside. Pressurized container 1 can alternatively be formed such that the tubular side wall 2 and the underside of the container are formed integrally in one piece, corresponding to a PET bottle formed by means of blow moulding. Tubular body 2 is provided with an opening with a flange 4 at the position of an upper side of pressurized container 1. The flange preferably comprises an edge extending radially outward, such that edge 4 can be used for mounting a closing mechanism 5 for closing the opening. Tubular body 2 of pressurized container 1 is preferably manufactured from a plastic material such as PET. Tubular body 2 is alternatively manufactured from a metal.

[0026] A movable piston 6 is provided in tubular body 2. Tubular body is defined here as a hollow body extend-

ing in a longitudinal direction, wherein the cross-section of the body can be square and is preferably rounded, wherein the cross-section of the body is more preferably oval and wherein the cross-section of the body is most preferably round. Movable piston 6 divides the inner space of tubular body 2 into two chambers. Upper chamber 7 or first chamber 7 is defined by movable piston 6, a portion of the inner side of tubular body 2 and closing mechanism 5. A lower chamber 8 or second chamber 8 is defined by movable piston 6, another portion of the inner side of tubular body 2 and bottom 3 of pressurized container 1. The sum of the volume of first chamber 7 and second chamber 8 is substantially constant. First chamber 7 is provided to be fully filled with the product which is dispensed by pressurized container 1. Second chamber 8 is provided to be filled with a gas under pressure, for instance air under pressure.

[0027] Bottom 3 of pressurized container 1 preferably comprises a filling valve 9 for filling second chamber 8 with the gas under pressure. Such a filling valve 9 allows the whole pressurized container 1 to be assembled, the first chamber 7 to be filled with the product and, as final step, the second chamber 8 to be filled with the gas under pressure, such that pressurized container 1 becomes operational. Because assembly of the pressurized container can take place without the pressurized container being under pressure, since the pressurized container can only be pressurized as final step through the addition of gas under pressure into the second chamber via filling opening 9, assembly and filling of pressurized container 1 according to the invention is simple. Filling opening 9 is preferably reusable, such that pressurized container 1 is also reusable.

[0028] Movable piston 6 is preferably bowl-shaped, wherein movable piston 6 comprises a bottom 10 and an upright wall 13. Bottom 10 of movable piston 6 preferably has a curve corresponding to the curve of tubular body 2 at the position of the upper side of pressurized container 1. Bottom 10 of movable piston 6 is further preferably provided with an indentation 11 which is formed such that closing mechanism 5 can be received in indentation 11 when movable piston 6 is located at the top of pressurized container 1. Forming bottom 10 of movable piston 6 in such a way allows piston 6 to move upward in pressurized container 1 such that the volume of first chamber 7 can be reduced to a maximum of 10% of the overall volume of the pressurized container. The overall volume of the pressurized container is defined here as the sum of the volume of first chamber 7 and second chamber 8. The volume of first chamber 7 can preferably be reduced to a maximum of 5% of the overall volume of pressurized container 1, more preferably to a maximum of 3% of the overall volume of pressurized container 1, most preferably a maximum of 1 % of the overall volume of pressurized container 1. It will be apparent here to the skilled person that the smaller the volume of the first chamber can become when movable piston 6 is in an uppermost position, the less product remains as residue in first

chamber 7, when pressurized container 1 is deemed empty by a user. It will further be apparent here that a user deems the pressurized container empty when piston 6 has reached its uppermost position, and is thus no longer able to dispense product from the container.

[0029] Strengthening ribs 12 can be provided in order to be able to make bottom 10 with indentation 11 of movable piston 6 sufficiently strong. These strengthening ribs 12 are preferably provided between the indentation and the curved bottom at the position of an inner side of the bowl-shaped piston.

[0030] The bowl-shaped movable piston 6 further comprises an upright wall 13 connected to bottom 10 of movable piston 6. The upright wall of the bowl-like movable piston 6 is substantially tubular and has outer dimensions and a form substantially equal to the inner dimensions and form of tubular body 2 of pressurized container 1, such that movable piston 6 lies against the inner side of tubular body 2 and thus separates first chamber 7 from the second chamber.

[0031] Upright wall 13 of the bowl-shaped movable piston 6 is preferably provided at the position of its outer side with a plurality of concentric lips 14. Each lip 14 is connected here to the outer side of upright wall 13, and each lip 14 extends outward at an angle relative to the axis of tubular upright wall 13 of between 10° and 80°, preferably between 20° and 60°, preferably between 30° and 50°. This plurality of concentric lips 14 functions as serial barrier for the gas under pressure in second chamber 8, such that this gas cannot move to first chamber 7.

[0032] Tests have shown that the pressure necessary in second container 8 in order to be able to press movable piston 6 into its uppermost position when dispensing a product is typically of a nature such that the internal pressure in pressurized container 1 causes tubular wall 2 to stretch at least partially such that the inner diameter of tubular body 2 is greater centrally in pressurized container 1 than when the same tubular body 2 is not under pressure. Movable piston 6 must be able to compensate these differences in inner diameter of tubular body 2 resulting from the internal pressure of the pressurized container in order to prevent bleed through movable piston 6. Bleed through piston 6 is here understood to mean a situation in which movable piston 6 is unable to separate first chamber 7 and second chamber 8 from each other, whereby air under pressure from second chamber 8 moves to first chamber 7. A good operation of pressurized container 1 can no longer be ensured in such a situation.

[0033] The specific form of movable piston 6 as shown in figure 1 and as described above has the result that the movable piston can compensate the differences in diameter of tubular wall 2. Movable piston 6 can also operate well under high pressures. This is due to the bowl shape of movable piston 6, which has the consequence that a pressure in second chamber 8 results in a force F, shown in figure 1, being applied to the upright wall of bowl-shaped piston 6, which force F presses upright wall 13 against the inner side of tubular wall 2. It will be apparent

that the force F depends directly on the height of the pressure in second chamber 8. A high pressure in second chamber 8 will hereby result in the force F with which upright wall 13 of movable piston 6 is pressed against inner wall 2 of pressurized container 1 being great, such that high pressure 8 is firmly closed off and kept separated from first chamber 7. When the pressure in second chamber 8 decreases the force F will also decrease, whereby the resistance of movement of the piston also decreases. Tests have shown that such a construction of pressurized container 1 is surprisingly effective. Movable piston 6 is preferably manufactured from a plastic material and with a hardness chosen such that the above-described action is realized. This means that the bowl-shaped piston is formed, and the material is chosen, such that force F results in a deformation of the movable piston which is substantially equal to or greater than the deformation of tubular wall 2 of the pressurized container when it is placed under pressure. The open side of the bowl-shaped movable piston 6 is preferably directed toward second chamber 8, such that the force F of the gas under pressure in second chamber 8 presses against the inner side of the bowl shape and thus pushes open the bowl shape so as to press against the inner wall of tubular wall 2 as shown in figure 1. The movement of movable piston 6 when dispensing product from pressurized container 1 is shown in figure 1 with arrow 15.

[0034] Figure 2 shows a closing element 5 with a mechanism for dispensing product, which closing mechanism 5 is provided to close pressurized container 1 at the position of edge 4. Closing mechanism 5 is provided here to be fastened on flange 4 of pressurized container 1. Closing element 5 preferably comprises two segments 16 and 17. The two segments 16 and 17 are preferably formed adjacently of each other here, such that different types of first segment and different types of second segment can be interchanged. The first segment is provided here with a valve mechanism for opening and closing a channel which extends between first chamber 7 of pressurized container 1 and an outer side of pressurized container 1, such that product from first chamber 7 can be dispensed via the channel to a position outside pressurized container 1. Second segment 17 comprises a flow regulator. Because flow regulator 17 is formed adjacently of valve mechanism 16, different types of flow regulator 17 can be combined and interchanged with different types of valve mechanism 16, depending on the type of product with which first chamber 7 is filled.

[0035] The valve mechanism formed in first segment 16 comprises a push button 18 which is mounted on a spring 19, such that push button 18 is movable between an open position as shown in figure 3 and a closed position as shown in figure 2. Spring 19 is provided in order to press push button 18 to its closed position. The valve mechanism will thus always be closed in non-operated mode. When push button 18 is operated, i.e. push button 18 is pressed downward counter to spring 19, the valve opens. The movement of push button 18 is illustrated in

figure 2 with arrow 22.

[0036] Valve mechanism 16 has a channel 20. Channel 20 extends between first chamber 7 of pressurized container 1 and the outer side of pressurized container 1. Channel 20 is formed such that channel 20 is closed off in the closed position of the push button, while the channel is open in the open position of the push button. Channel 20 in push button 18 as shown in figures 2 and 3 comprises for this purpose a plurality of segments. Channel 20 is preferably formed at the position of the spring by a central opening, designated in figure 2 with reference numeral 20a. Because opening 20a in push button 18 extends centrally at the position of spring 19, preferably along a longitudinal axis of the push button, the product can flow into channel 20a through the centre of spring 19, as illustrated with arrow 27. Spring 19 will hereby not form an additional resistance to the flow of the product. It is noted here that in compressed state spring 19 would have to flow through the spring element in order to move to channel 20, a flow through the spring being here a flow perpendicularly of arrow 27. A further segment of channel 20 is formed between a housing of the push button and the push button. This segment of the channel is illustrated in figure 2 with reference numeral 20. Central opening 20a is in liquid connection with the second segment of channel 20 by means of a transverse opening in push button 18. A further transverse opening 20b is preferably provided between channel 20 and the outflow channel 20c of push button 18. This transverse opening 20b is positioned relative to a closing ring 21 such that in the closed position of push button 18 transverse opening 20b is closed by closing ring 21, while in the open position of push button 18 transverse opening 20b has been moved away from closing ring 21 such that closing ring 21 does not block channel 20b. Channel segment 20 will thus be connected to transverse channel 20b in the open position, such that product can flow via channel segment 20, through channel segment 20b and into outflow opening 20c. The size of channel 20 can be chosen by a skilled person on the basis of the type or sort of product with which first chamber 7 is filled. If this product has a high fluidity (low viscosity) an opening with a small size will suffice. If the product has a higher viscosity, for instance a gel, channel 20 will be made larger so as to be able to realize sufficient flow of product through the channel.

[0037] The position of outflow of channel 20c to the surrounding area is shown at the top of the push button in the embodiment of figure 2. Channel 20 will in practice typically be bent at the position of the top of the push button, toward an opening located at the position of a side of the push button. A user can thus push the top of the push button, in line with spring 19, while the product is dispensed from a side of the push button. This allows comfortable use of the push button.

[0038] Second segment 17 is formed as flow regulator. Flow regulators can operate on the basis of different prin-

principles. The flow regulator for application in the pressurized container according to the invention is preferably formed as described below. The flow regulator is preferably formed with a conical housing 23 and an elastic annular element 24. The flow regulator is provided here to allow product to flow through the elastic annular element and the conical housing as designated in figure 2 with arrow 26. When the pressure difference between first chamber 7 and the area surrounding pressurized container 1 is great, product will be pressed through the flow regulator with great force, whereby the elastic annular element is compressed in the conical housing and thus narrows the size of the channel through the flow regulator. When the pressure difference between first chamber 7 and the area surrounding pressurized container 1 is relatively small, the product will on the other hand be pressed through the flow regulator with little force, whereby the elastic annular element 23 is only pressed into the conical housing a little, or hardly so, such that the opening through the flow regulator does not narrow, or hardly so. A relatively constant flow rate is in this way obtained during dispensing of the product from container 1 according to the invention, irrespective of the pressure in first chamber 7. Conical housing 23 can also be seen as a funnel with a diameter which decreases in the direction of the outlet of the pressurized container. The annular element is placed in the conical part of the funnel and will be pressed deeper or less deep into the funnel due to its elasticity during outflow of the product, whereby the size of the opening of the funnel and elastic annular element is adjusted inversely proportionally to the pressure difference between first chamber 7 and the area surrounding pressurized container 1. The size of the opening of the flow regulator is shown in figure 2 with reference numeral 25.

[0039] The product flow direction of the flow regulator is determined by the elastic annular element 24 and conical housing 23. The product flow direction is shown in figure 2 with arrow 26. This product flow direction 26 preferably lies in line with spring 19 and channel 20a extending in push button 18 at the position of the spring element. The product from the first chamber can thus move via a linear movement through flow regulator 17 and through at least a lower part of push button 18. Push button mechanism 16 is hereby placed in series and in line with flow regulator 17.

[0040] Placing flow regulator 17 and push button mechanism 16 in series and in line allows pressurized containers 1 according to the invention to be optimized in simple manner for dispensing different types of product. Push buttons with different dimensions and different outflow designs can thus be mounted in series with different types of flow regulator in order to optimize the flow rate as a function of the type of product.

[0041] The above described flow regulator and the push button mechanism can be manufactured in simple and inexpensive manner. They can also be easily manufactured from materials which have been approved for

use in the food industry and/or in the cosmetic industry. This allows pressurized container 1 according to the invention to be used for cosmetic products such as shaving gels, hair gels, liquid soaps, hairspray, deodorant, day cream, hand scrub, perfume, aftershave, body milk, disinfecting alcohol and so on. In the food industry the pressurized container 1 according to the invention can be used for sauces such as mayonnaise, ketchup, mustard and other sauces, as well as oils, whipped cream, liquid frying butter, syrups and so on. The above stated products are only examples, and the pressurized container can also be used for other applications and in other industries. Pressurized containers according to the invention can thus for instance be filled with cleaning products from the cleaning industry. The skilled person will appreciate that each product has its recommended outflow speed for being used optimally by a user, and that the different products stated above have different viscosities. The skilled person can optimize the pressurized container 1 according to the invention, particularly the push button and the flow regulator, on the basis of this information, which is known to the skilled person, in order to obtain the desired outflow.

[0042] Different features of the flow regulator can be adjusted so as to influence the operation of the flow regulator, as will be appreciated by the skilled person. The conicity of conical housing 23 can thus be adjusted. The elastic annular element will tend to narrow the opening of the flow regulator more or less by giving conical housing 23 a steeper or less steep conicity. The elasticity and the dimensions of the elastic annular element can also be optimized so as to influence the operation of the flow regulator. It will thus be apparent that when an annular element with a higher elasticity is chosen, this will increase the effect of the narrowing on the pressure difference. The flow regulator is preferably provided at the position of first chamber 7 with an inward directed flange which prevents annular element 24 falling out of the flow regulator.

[0043] Figure 3 shows valve 16 in the open position and shows how channel 20 is connected to channel 20b such that product from first chamber 7 can flow out via channel 20.

[0044] The description and figures are intended only to illustrate the invention. It will be apparent here to the skilled person that the above described and the shown embodiments are only several possible embodiments of the invention, and that the invention can also be applied in other manner. The description and the figures are therefore not intended to limit the invention. The scope of protection will be defined solely in the claims.

Claims

1. Pressurized container for dispensing a product, wherein the pressurized container has a tubular body with a movable piston which divides the space inside

the tubular body into two chambers, wherein a first chamber of the two chambers is provided to be filled with the product and wherein a second chamber of the two chambers is provided to be filled with a gas under pressure, wherein the pressurized container further comprises a channel extending outside from the first chamber in order to dispense the product, which channel is provided with a valve which can be operated by a user and which channel is further provided with a flow regulator.

2. Pressurized container as claimed in claim 1, wherein the flow regulator is provided to vary an opening of the channel inversely proportionally relative to a pressure in the first chamber.
3. Pressurized container as claimed in claim 2, wherein the flow regulator is provided to continuously vary an opening of the channel as a function of a pressure of the first chamber.
4. Pressurized container as claimed in claim 3, wherein the flow regulator comprises a conical housing in which an elastic annular element is placed such that the channel runs through the housing and the annular element, all this such that the annular element narrows the channel when the product flows through the channel, and wherein the narrowing is dependent on the pressure difference between the first chamber and a surrounding area.
5. Pressurized container as claimed in any of the foregoing claims, wherein the valve has an open position in which the channel is provided to allow passage of product, and a closed position in which the channel is blocked in order to retain product in the first chamber.
6. Pressurized container as claimed in claim 5, wherein the valve is formed as a push button mounted on a spring element, so that the push button is pushed to the closed position by the spring element and so that a user can push the push button to the open position counter to the spring element.
7. Pressurized container as claimed in claim 4 and claim 6, wherein an axis of the conical housing substantially coincides with an axis of the spring element.
8. Pressurized container as claimed in claim 7, wherein the push button comprises an internal channel lying at least partially in line with the spring element at the position of the spring element.
9. Pressurized container as claimed in any of the foregoing claims, wherein the product in the first chamber is physically separated from the gas in the sec-

ond chamber by the movable piston.

10. Pressurized container as claimed in any of the foregoing claims, wherein the piston is movable such that a pressure in the first chamber is substantially the same as a pressure in the second chamber.
11. Pressurized container as claimed in any of the foregoing claims, wherein the second chamber is provided with a filling opening for filling the second chamber with the gas, which filling opening can be closed by a plug.
12. Pressurized container as claimed in any of the foregoing claims, wherein the product is chosen from a cosmetic product and a food product.
13. Pressurized container as claimed in any of the foregoing claims, wherein the movable piston is bowl-shaped, wherein the piston comprises a bottom and an upright wall, wherein the open side of the bowl-shaped piston is directed toward the second chamber and wherein the upright wall is provided at the position of its outer side with a plurality of concentric and elastic lips which are pressed against the inner wall of the tubular body by the pressure in the second chamber so as to separate the second chamber from the first chamber.
14. Pressurized container as claimed in claim 13, wherein the piston is manufactured from an elastic material.
15. Pressurized container as claimed in one of the claims 13 or 14, wherein the piston has an indentation at the position of its bottom such that the flow regulator and/or valve can be received at least partially in the indentation in an extreme position of the piston.

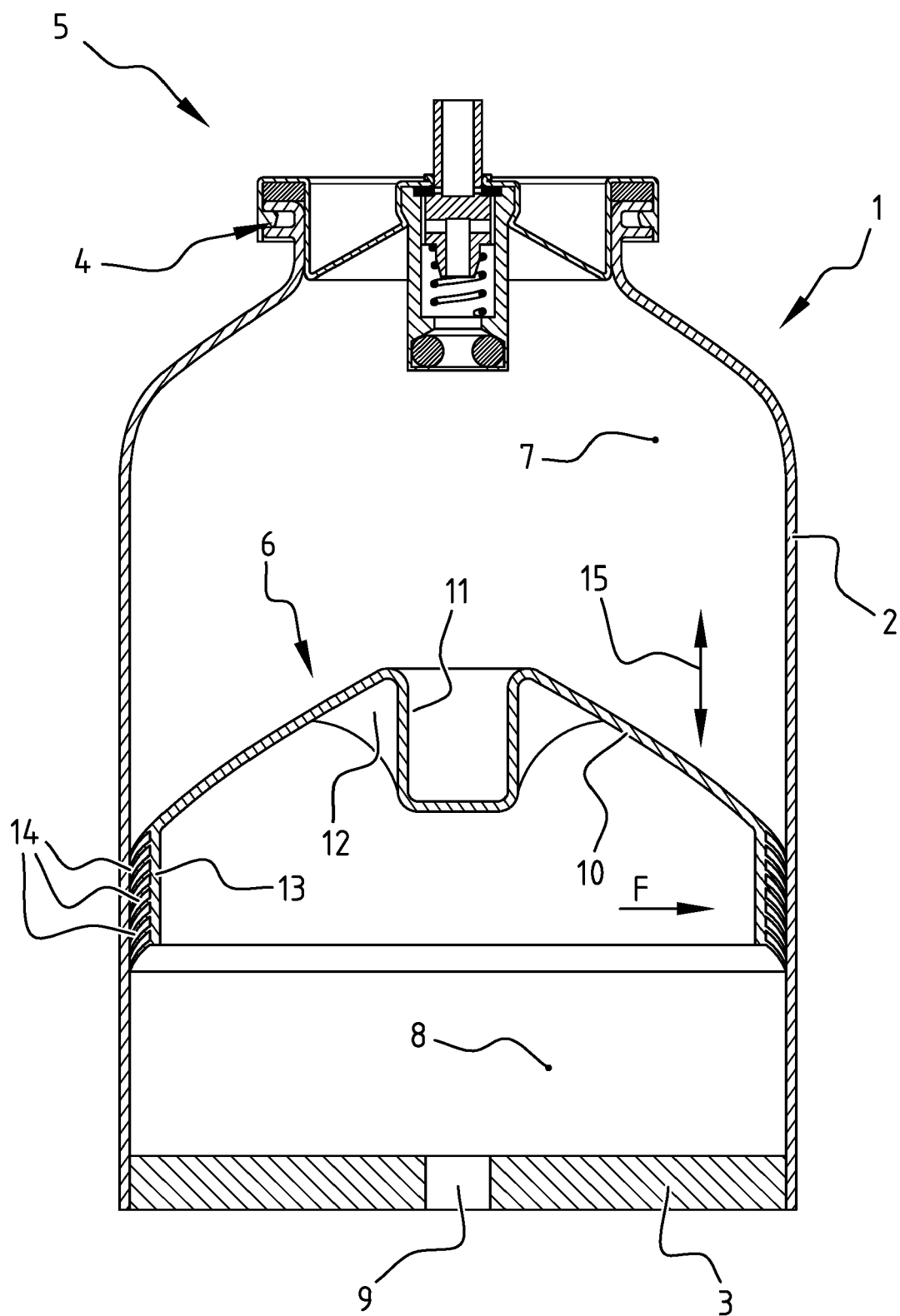
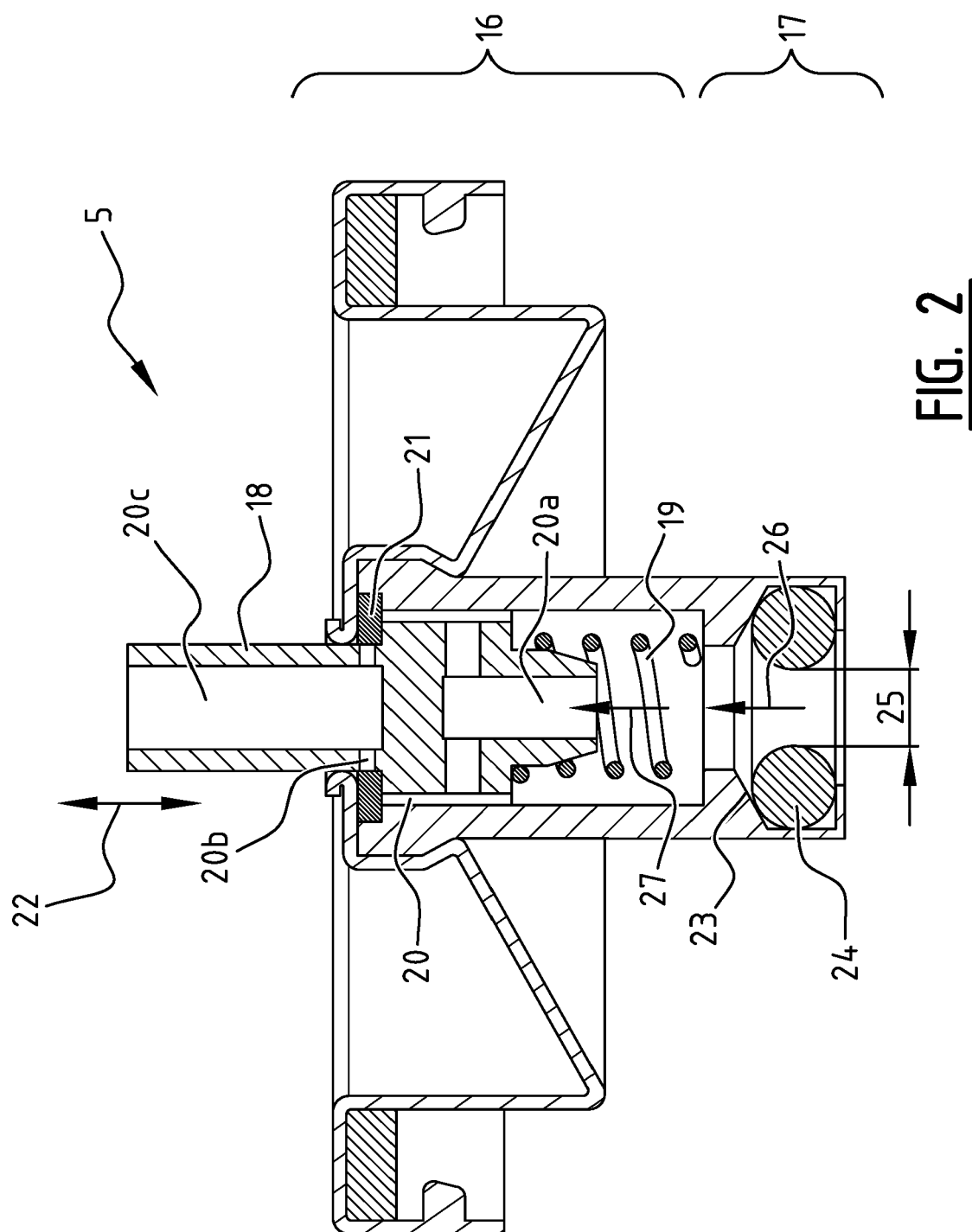


FIG. 1



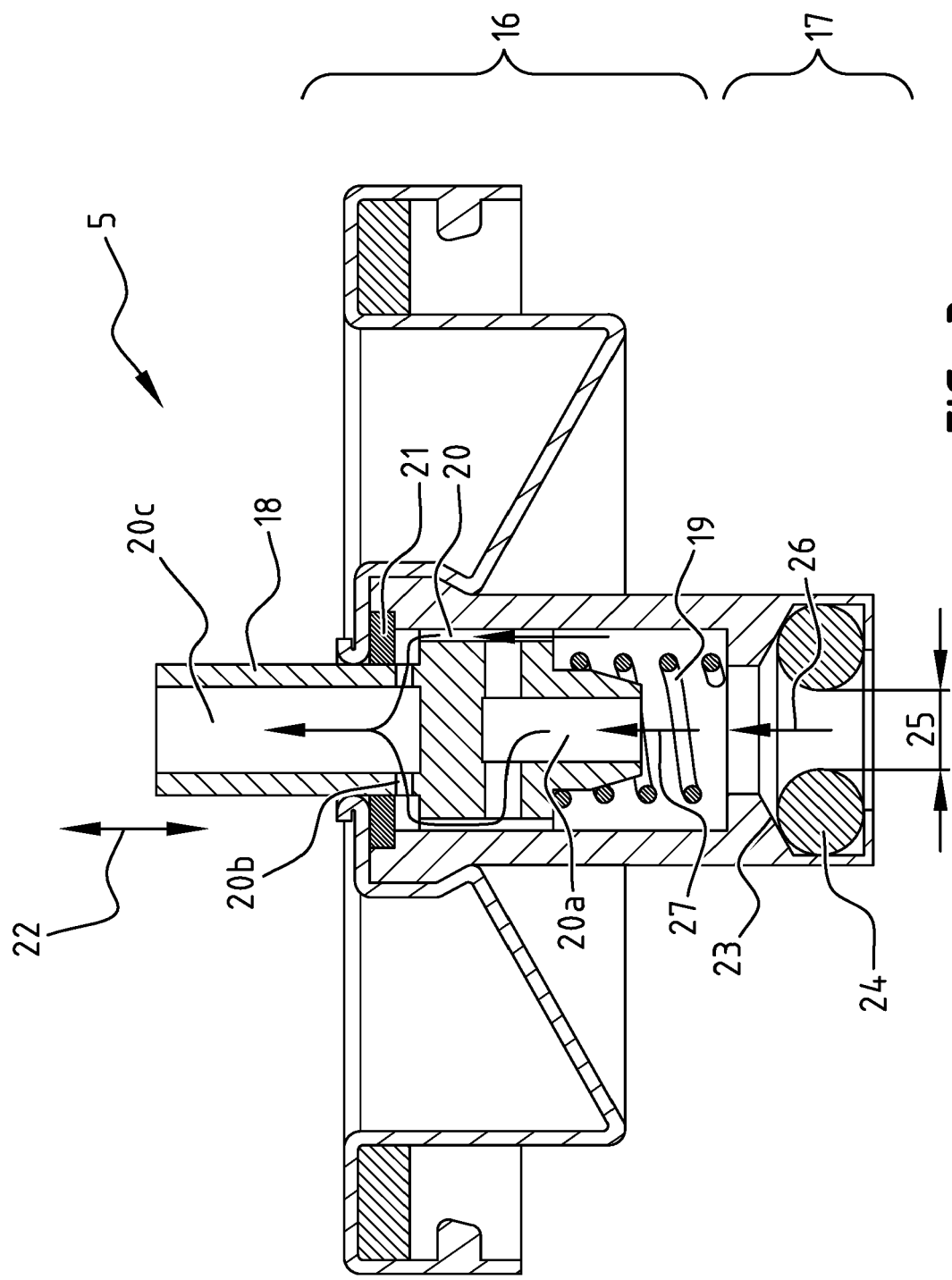


FIG. 3



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